What Is Claimed Is:

1. A bipolar electrode with a semiconductor coating, comprising an anode and a cathode, said anode and cathode displaced apart from one another, said cathode and anode comprising a body material selected from the group consisting of elements of the main groups III, IV and the groups 4-7 of the periodic system or mixtures thereof, and a semiconductor coating on the outer surface of said anode body, said semiconductor coating selected from the group consisting of at least one element of groups 4-7 of the periodic system.

2. A bipolar electrode with a semiconductor coating in accordance with claim 1 wherein in that the body material of the cathode and/or the anode consists of titanium alone or in combination with another group III, IV or groups 4-7 element.

3. A bipolar electrode with a semiconductor coating in accord with claim 1 wherein the semiconductor coating applied on the body material of the anode comprises a titanium oxide (Ti_xO_y), wherein x and y are positive integers.

4. A bipolar electrode with a semiconductor coating in accordance with claim 3 wherein said semiconductor coating is TiO_2.

5. A bipolar electrode with a semiconductor coating in accordance with claim 1 wherein the body material of at least one of the two electrodes is provided with a coating of at least one element selected from the group consisting of subordinate groups 1, 2 and 8 of the periodic system, or mixtures thereof.

6. A bipolar electrode with a semiconductor coating in accordance with claim 5 wherein said coating comprises platinum.

7. A bipolar electrode with a semiconductor coating in accordance with claim 5 wherein the thickness coating on the anode is between 1 and 2 μm.

8. A bipolar electrode with a semiconductor coating in accordance with claim 1 wherein the semiconductor coating applied to the body material of the anode is dosed with one or more of the elements of the first, second, and/or eighth subordinate groups of the periodic system.

9. A bipolar electrode with a semiconductor coating in accordance with claim 8 wherein iron (Fe) is employed as an element for dosing of the semiconductor.

10. A bipolar electrode with a semiconductor coating in accordance with claim 9 wherein the concentration of iron (Fe) in the semiconductor coating is in the range of 1 wt% to 33 wt%.

11. A bipolar electrode with a semiconductor coating in accordance with claim 9 wherein the concentration of iron (Fe) in the semiconductor coating is approximately 23 wt%.

12. A bipolar electrode with a semiconductor coating in accordance with claim 4 wherein the titanium oxide coating is applied by means of a sol-gel procedure.

13. A bipolar electrode with a semiconductor coating in accordance with claim 9 wherein the dosing of the titanium dioxide coating with iron (Fe) is carried out by means of a sol-gel procedure.

14. A bipolar electrode with a semiconductor coating in accordance with claim 13 wherein the application of the titanium dioxide coating and the dosing with iron (Fe) is done substantially simultaneously.

15. A procedure for the electrolytic dissociation of water employing a bipolar electrode in accordance with claim 1, comprising the following process steps:

a.) preparing a bipolar electrode in accordance with claim 1;

b) inserting the bipolar electrode into an appropriate electrolyte within a container;

(c) adjusting the pH value of the electrolyte to a pH of about 13-14;

(d) applying a direct current voltage to the bipolar electrodes;

(e) continuously circulating the electrolyte liquid by means of a circulation apparatus; and

(f) discharging the gases evolved at the electrodes by means of a pair of gas lines.

16. A procedure in accordance with claim 15 wherein the temperature of the electrolysis is regulated at ca. 22 °C.

17. A procedure in accordance with claim 15 further containing the step of continuously radiating the anode with UV-radiation in the range of ca. 250 to 380 nm.

18. A procedure in accordance with claim 17 wherein the source of the UV-radiation lies outside of the container for the electrolyte liquid.